740301-411
Exhibit 5

JASWANT S. PANNU and JASWANT S. PANNU, M.D., P.A., Plaintiffs-Appellants, v. STORZ INSTRUMENTS, INC., Defendant-Appellee.

00-1482

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

2001 U.S. App. LEXIS 16645

July 25, 2001, Decided

PRIOR HISTORY:
Appealed from: United States District Court for the Southern District of Florida. Judge William P. Dimitrouleas.

DISPOSITION:
AFFIRMED.

CASE SUMMARY

PROCEDURAL POSTURE: Appellant patent holder sued appellee alleged patent infringer for patent infringement. The United States District Court for the Southern District of Florida granted summary judgment in favor of the retailer. The patent holder sought review.

OVERVIEW: The holder applied for a patent for an artificial eye lens, which was rejected by the patent office as obvious. The holder then filed a supplemental amendment which cancelled most of the claims in the patent request, and made eight new claims. The patent office accepted one of the holder's new claims, subject to minor amendments, and issued a patent. The holder then sought a reissue of the patent because he had unnecessarily narrowed the claims beyond what was necessitated by the "applied prior art." The patent office allowed the reissue, but required some additional language to be included in the reissued patent. The trial court granted summary judgment for the alleged infringer because the reissued patent improperly recaptured subject matter the holder surrendered in obtaining the first patent. The appellate court held that in prosecuting the patent , the holder specifically limited the shape of the haptics to a "continuous, substantially circular arc." On reissue, the "recapture rule" prevented the holder from attempting to recapture the precise limitation he added to overcome the prior art rejections of his original patent application.

OUTCOME: The grant of summary judgment was affirmed.

COUNSEL:
Michael C. Cesarano, Akerman, Senterfitt & Eidson, P.A., of Miami, Florida, argued for plaintiffs-appellants.

Edward W. Remus, McAndrews, Held & Malloy, Ltd., of Chicago, Illinois, argued for defendant-appellee. With him on the brief was Jonathan R. Sick. Of counsel on the brief were Craig E. Larson, Bausch & Lomb, Incorporated, of Rochester, New York; and Rita D. Vacca, Bausch & Lomb Surgical, Inc., of St. Louis, Missouri.

JUDGES:
Before MAYER, Chief Judge, FRIEDMAN, Senior Circuit Judge, and RADER, Circuit Judge.

OPINIONBY:
MAYER

OPINION:

MAYER, Chief Judge.

Jaswant S. Pannu and Jaswant S. Pannu, M.D., P.A. (collectively Pannu) appeal the judgment of the United States District Court for the Southern District of Florida, *Pannu v. Storz Instruments, Inc., 106 F. Supp. 2d 1304 (S.D. Fla. 2000),* granting summary judgment for Storz Instruments, Inc. (Storz) that U.S. Patent No. Re *32,525* is invalid under *35 U.S.C. § 251,* the recapture rule. Because the reissued patent improperly broadened claims in a manner directly pertinent to subject matter surrendered during prosecution, we affirm.

Background

In 1980, Pannu filed a patent application for an artificial intraocular lens, S/N 136,243 ('243 application). An intraocular lens is an artificial plastic lens that may be implanted in an eye to replace a natural lens. The '243 application disclosed a round lens called an "optic" that focuses light on the retina, and two or more elements called "haptics" that are attached to the optic and contact internal tissue in the eye for the purpose of positioning and securing the optic. The haptics in Pannu's application included "snag resistant" discs at the end. In 1981, Pannu filed a continuation-in-part application, S/N 261,953 ('953 application), based on the original '243 application. The '953 application added new matter, claiming a lens in which the haptics are "integrally molded" to the lens body, and the lens could be placed in either the anterior or posterior chamber of the eye. *

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n1 The eye is considered to have two chambers separated by the iris. The anterior chamber lies between the back surface of the cornea and front surface of the iris. Attorneys' Dictionary of Medicine and Word Finder A-280 (1995). The posterior chamber is the space between the back surface of the iris and the front surface of the crystalline lens. Id. at P-280.

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Independent claim 1 of the '953 application reads as follows:

A posterior chamber intraocular lens comprising:

a lens having a width and a thickness;

a retention loop including a flexible strand having a width and a thickness and such strand is joined at one end to the lens and has an opposite free end;

and a snag resistant disc joined to the flexible strand's free end;

said snag resistant disc having a width which is at least 3 times greater than the thickness of the disc, at least 3 times greater than the width of the

flexible strand, and at least 1/5 as great as the width of the lens for smoothly guiding the free end of the flexible strand across an inner edge of an iris when moving said strand into and out of a posterior chamber of an eye;

said snag resistant disc lying in a plane sufficiently close to a plane of the lens so that both the disc and lens can fit into a posterior chamber behind an eye's iris.

The examiner rejected claims 1-14 as obvious under *35 U.S.C. § 103* in light of four prior art references: U.S. Patent No. *4,159,546* (Shearing patent), a publication showing the "Lindstrom Centrex" lens, U.S. Patent No. *4,249,271* (Poler patent), and U.S. Patent No. *4,092,743* (Kelman patent). In response, Pannu filed a supplemental amendment that cancelled claims 1-7 and 10-14, added new claims 16-22, and modified claims 8 and 9 to be dependent upon claim 16. Independent claim 16 reads as follows:

An intraocular lens comprising:

a lens body;

at least two flexible positioning and supporting elements integrally formed with said lens body and extending from the periphery of said lens body;

said elements defining a continuous, substantially circular arc having a diameter greater than the diameter of said lens body, said arc curved toward said lens circumference; and snag resistant means integrally formed on the free end of said elements for smoothly guiding the lens across eye tissue when implanting the lens.

Pannu raised six arguments for the patentability of claim 16 over the four prior art references, including the distinction of "a continuous substantially circular arc having a diameter greater than the diameter of the lens body . . . which significantly enhance the easy insertibility of applicant's lens and significantly reduce any possibility of snagging delicate eye tissue." The examiner accepted Pannu's arguments, and allowed claim 16 subject to minor amendments to set forth precisely the structural details of the haptics. Claim 16 issued as claim 1 of U.S. Patent No. *4,436,855* (*'855* patent) and reads as follows:

An intraocular lens comprising:

a lens body;

at least two spaced flexible positioning and supporting elements integrally formed with said lens body as a one piece construction and extending radially outward from the periphery of said lens body;

said elements defining a continuous, substantially circular arc having a diameter greater than the diameter of said lens body, said arc curved toward said lens circumference and terminating in a free end spaced from said periphery; and snag resistant means integrally formed on the free end of said elements for smoothly guiding and positioning the lens across contacted eye tissue when implanting the lens,

said snag resistant means having an uninterrupted continuously smoothly curved outer periphery which merges with said free end and is substantially greater in size than the width of said flexible elements.

In 1985, Pannu filed an application for reissue of the *'855* patent. The supplemental reissue oath stated that Pannu "unduly and without deceptive intent narrowed the claims beyond what was necessitated by the applied prior art by describing the shape of the outwardly extending elements as defining 'a continuous, substantially circular arc having a diameter greater than the diameter of the lens body.'" The examiner allowed Pannu to delete "defining a continuous, substantially circular arc having a diameter greater than the diameter of said lens body, said arc curved toward said lens circumference and terminating in a free end" from claim 1. However, the examiner required Pannu to insert additional limitations into the last section of the claim. The last section of claim 1 reads as follows with italics indicating additions and bracketing indicating deletions:

said snag resistant means having an uninterrupted, continuously smoothly curved outer periphery which merges with said free end and is [substantially] at least three times greater in [size] width than the width of said flexible elements, said snag resistant elements and said positioning and supporting elements being substantially coplanar.

The *'855* patent reissued as U.S. Patent No. Re *32,525* (*'525* reissue).

Pannu filed suit against Storz, alleging that intraocular lenses sold by Storz infringed the *'525* reissue. Storz filed a counterclaim seeking a declaratory judgment of patent invalidity, and moved for summary judgment that the *'525* reissue improperly recaptures subject matter Pannu surrendered in obtaining allowance of claim 1 of the *'855* patent. The court granted Storz's motion for summary judgment of invalidity and Pannu appeals.

Discussion

We review a district court's grant of summary judgment de novo." *Vanmoor v. Wal-Mart Stores, Inc., 201 F.3d 1363, 1365, 53 USPQ2d 1377, 1378 (Fed. Cir. 2000)*. Determining whether the claims of a reissued patent violate *35 U.S.C.* § *251* is a question of law, which we review de novo. *In re Clement, 131 F.3d 1464, 1468, 45 USPQ2d 1161, 1163 (Fed. Cir. 1997); Mentor Corp. v. Coloplast, Inc., 998 F.2d 992, 995, 27 USPQ2d 1521, 1524 (Fed. Cir. 1993)*. This legal conclusion can involve underlying findings of fact, which are reviewed for substantial evidence. *Hester Indus., Inc. v. Stein, Inc., 142 F.3d 1472, 1479, 46 USPQ2d 1641, 1647 (Fed. Cir. 1998); Mentor, 998 F.2d at 994, 27 USPQ2d at 1524* (citing *Ball Corp. v. United States, 729 F.2d 1429, 1439, 221 USPQ 289, 297 (Fed. Cir. 1984))*. However, summary judgment is appropriate only when there is no genuine issue as to any material fact and the moving party is entitled to judgment as a matter of law. *Vanmoor, 201 F.3d at 1365, 53 USPQ2d at 1378*. The underlying facts in this case are taken directly from the prosecution file histories and the claims of the *'855* patent and the *'525* reissue, and are not disputed. See *Hester, 142 F.3d at 1484, 46 USPQ2d at 1651*. Claim construction is a purely legal question, *Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1456, 46 USPQ2d 1169, 1174 (Fed. Cir. 1998)* (en banc), and therefore, comparison of the claims of the *'855* patent and the *'525* reissue is a purely legal question appropriate for summary judgment, *Westvaco Corp. v. Int'l Paper Co., 991 F.2d 735, 741, 26 USPQ2d 1353, 1358 (Fed. Cir. 1993)* ("A determination of whether the

- USP 4780??
- USP Re 33510 Re 35251 458204

scope of a reissue claim is identical with the scope of the original claim is a question of law, which we review de novo.").

The recapture rule "prevents a patentee from regaining through reissue the subject matter that he surrendered in an effort to obtain allowance of the original claims." *Clement, 131 F.3d at 1468, 45 USPQ2d at 1164.* Reissued claims that are broader than the original patent's claims in a manner directly pertinent to the subject matter surrendered during prosecution are impermissible. Id. (quoting *Mentor, 998 F.2d at 996, 27 USPQ2d at 1525).* Application of the recapture rule is a three-step process. The first step is to "determine whether and in what 'aspect' the reissue claims are broader than the patent claims." Id. "The second step is to determine whether the broader aspects of the reissued claim related to surrendered subject matter." Id. Finally, the court must determine whether the reissued claims were materially narrowed in other respects to avoid the recapture rule. *Hester, 142 F.3d at 1482-83, 46 USPQ2d at 1649-50; Clement, 131 F.3d at 1470, 45 USPQ2d at 1165.*

With respect to the shape of the haptics, claim 1 of the *'525* reissue is broader than claim 1 of the original *'855* patent. Claim 1 of the *'855* patent limited the haptics to "a continuous, substantially circular arc having a diameter greater than the diameter of said lens body, said arc curved toward said lens circumference." Claim 1 of the *'525* reissue eliminated this limitation on the shape of the haptics. "A reissue claim that does not include a limitation present in the original patent claims is broader in that respect." *Hester, 142 F.3d at 1480, 46 USPQ2d at 1648.* In addition, Pannu's reissue oath admitted that he unnecessarily narrowed the scope of the claim with respect to the shape of the haptics. He stated that "the [haptics] may actually be of any shape as long as the elements terminate in a free end having snag resistant means as now recited in claim 1." Correction of Pannu's unnecessary narrowing of claim 1 must involve a corresponding broadening of the reissued claim.

Pannu argues that even if the reissued claim is broader, it did not relate to subject matter surrendered during prosecution. This argument is without merit. As originally filed, none of the claims in the '953 application limited the shape of the haptics. The examiner rejected claims 1-14 as obvious. In response to the rejection, Pannu filed a supplemental amendment canceling claim 1 and adding new independent claim 16. Claim 16 described the haptics as "defining a continuous, substantially circular arc having a diameter greater than the diameter of said lens body, said arc curved toward said lens circumference." Pannu argued to the examiner, "no such particular shape is disclosed by the lenses of either Shearing or Lindstrom. In fact, Shearing teaches away from the concept of a continuous substantially circular arc supporting strand . . . [and] the Lindstrom lens illustrates a supporting strand with a somewhat irregular, elliptical shape." The addition of the "continuous, substantially circular arc" limitation to claim 16 and the statements made by Pannu to the examiner during prosecution of the *'855* patent limited the claim to exclude an interpretation that did not include a continuous, substantially circular arc. See *Southwall Techs., Inc. v. Cardinal AG Co., 54 F.3d 1570, 1576, 34 USPQ2d 1673, 1676 (1995).* The shape of the haptics was broadened during reissue and was the same subject matter that was surrendered during prosecution.

Pannu argues, however, that because the reissued claims were materially narrowed in other respects, the *'525* reissue avoids the recapture rule. See *Hester, 142 F.3d at 1482-83, 46 USPQ2d at 1649-50; Clement, 131 F.3d at 1470, 45 USPQ2d at 1165; Mentor, 998 F.2d at 996, 27 USPQ2d at 1525.* Instead of being "substantially greater" than the width of the haptics, the snag resistant means must now be "at least three times greater" than the width of the haptics. In addition, the snag resistant means must now be "substantially coplanar" with the

haptics. Pannu argues that both modifications relate to the configuration of the haptics, and therefore, what is gained by the elimination of one limitation is given up by the addition of the other limitations.

The "continuous, substantially circular arc" limitation related to the shape of the haptics. The narrowing aspect of the claim on reissue, however, was not related to the shape of the haptics, but rather the positioning and dimensions of the snag resistant means. Therefore, the reissued claims were not narrowed in any material respect compared with their broadening. Furthermore, "if the patentee is seeking to recover subject matter that had been surrendered during the initial prosecution this flexibility of analysis is eliminated, for the prosecution history establishes the substantiality of the change and estops its recapture." *Anderson v. Int'l Eng'g & Mfg., Inc., 160 F.3d 1345, 1349, 48 USPQ2d 1631, 1634 (Fed. Cir. 1998);* see also *Mentor, 998 F.2d at 996, 27 USPQ2d at 1525* ("In this case, the reissue claims are broader than the original patent claims in a manner directly pertinent to the subject matter surrendered during prosecution. Mentor thus attempted to reclaim what it earlier gave up."). In prosecuting the *'855* patent, Pannu specifically limited the shape of the haptics to a "continuous, substantially circular arc." On reissue, he is estopped from attempting to recapture the precise limitation he added to overcome prior art rejections.

Conclusion

Accordingly, we affirm the judgment of the United States District Court for the Southern District of Florida.

AFFIRMED

To sum up, there are many advantages in using the lens of this invention over any of the prior art lenses.

The most important advantage is the provision of a snag resistant loop which prevents injury to delicate eye tissue during implantation, centration, or removal of the lens.

The lens of the Shearing type requires more maneuvers, skill and a longer learning process for surgeons to master when inserting the superior loop of the lens, thus resulting in increasing the chance for injuring delicate eye tissue. These objections are eliminated when the snag resistant lens of this invention is used. It would be relatively easy for a surgeon to master the implantation, centration or removal of this lens without injury to delicate eye tissue.

Another advantage is that only a small force is needed by the surgeon to position the superior snag resistant ring during implantation. The tangentially curved resilient strands and the snag free loose end of the strand transfers this force into a circular movement of the lens body resulting in self centering of the lens with avoidance of undue pressure on the zonules below.

Since the lens of the invention is one that is a universal lens, a surgeon who is a novitiate will find this lens especially helpful because this lens is not only self-centering but also needs only minimal manipulation during implantation in an eye chamber.

Implantation of this new lens avoids the spring back which is present in the Shearing type lens which results in decentration. This lens, because of its tangentially formed strands, changes the downward force into a circular motion, thus avoiding any spring back landing to cause decentration.

All conventional posterior lenses are more easily implanted through a dilated pupil. The new snag free lens can be implanted through a dilated or a miotic pupil with equal ease.

If during a cataract operation, the delicate tissue of an eye is ruptured, use of the Shearing type lens with its free pointed end presents added danger of extending the tear because the free pointed end can slide further into the vitreous cavity. The snag resistant ring of this new lens avoids this difficulty.

In addition, while operating to be safe, the surgeon may decide to use this lens in the anterior chamber to avoid aborting the implantation procedure. This cannot be done with any of the prior art lenses. However, it can be done if the surgeon is using the lens of this invention.

The lens of this invention is the first universal lens implant since it can be implanted in any size of eye chamber, in a posterior chamber or in an anterior chamber. A tremendous saving in the stocking of an unduly large supply of lenses for surgeons and hospitals. Only the snag resistant lens of this invention need be stocked. No necessity now to stock many different sizes, a posterior lens and an anterior lens. All the different lenses have now been replaced with only one lens, a universally useful lens.

Finally, this novel lens can be used to determine the size of an eye chamber. This has never been possible before this lens. By merely measuring the distance between the edge of the loop and the edge of the lens with a microscopic chronometer and adding thereto the diameter of the ring and lens, the size of an eye chamber can be determined. No lens in the prior art is capable of effecting this result.

Those skilled in the art will also readily appreciate that there are various other modifications and adaptations of the precise form of the lens herein shown. For example, the ring which is approximately circular, could also be elliptical and would thus be equally useful with all the accompanying advantages so long as it is snag resistant.

What is claimed is:

1. An intraocular lens comprising:
a lens body;
at least two spaced flexible positioning and supporting elements integrally formed with said lens body as a one-piece construction and extending radially, outwardly from the periphery of said lens body;
said elements defining a continuous, substantially circular arc having a diameter greater than the diameter of said lens body, said arc curved toward said lens circumference and terminating in a free end spaced from said periphery; and
snag-resistant means integrally formed on the free end of said elements for smoothly guiding and positioning the lens across contacted eye tissue when implanting the lens, said snag resistant means having an uninterrupted, continuously, smoothly curved outer periphery which merges with said free end and is substantially greater in size than the width of said flexible elements.

2. An intraocular lens as recited in claim 1 wherein there are two of said flexible positioning and supporting elements and said elements are positioned opposite one another.

3. An intraocular lens as recited in claim 1 wherein said snag-resistant means comprise a circular disc.

4. An intraocular lens as recited in claim 3 wherein said disc has an opening therethrough.

5. An intraocular lens as recited in claim 3 wherein said disc has a diameter which is at least three times greater than the width of said flexible elements and at least one-fifth as great as the width of said lens body.

6. An intraocular lens as recited in claim 1 wherein said flexible elements contain a support member integrally formed with said flexible elements and the periphery of said lens body, said support member joined to said flexible element at a position remote from the point where said flexible element contacts the periphery of said lens body, thus defining a substantially triangular support base for said flexible element.

7. An intraocular lens as recited in claim 3 wherein said circular disc and said lens body lie in substantially the same vertical plane.

8. An intraocular lens as set forth in claim 1 wherein said flexible elements and said snag-resistant means are made from a clear material.

9. An intraocular lens as set forth in claim 1 wherein said flexible elements and said snag-resistant means are made from a colored material.

10. A method of measuring the size of an eye chamber by implanting a lens having tangentially resilient strands on opposed sides of an intraocular lens attached to the body of said lens; wherein the free end is connected to a snag resistant ring, adding the diameter sizes of said ring and said lens to the distance between the edge of said ring and the edge of said lens in mm. to determine the size of said eye chamber in mm.

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NOT CHANGE

33. The distance between the loop and the lens edge is measured to be 1 mm. When added together, it measures a 13 mm eye chamber size which is a large chamber size. In (c), wherein the ring to lens distance is less, a 12 mm eye chamber is measured which is a medium chamber size. In (d), wherein the ring and lens edges meet, the eye chamber measures 11 mm which is a small chamber size. To aid in sighting for measuring, it is helpful to slightly tint the snag resistant rings, however they could also be clear.

To sum up, there are many advantages in using the lens of this invention over any of the prior art lenses.

The most important advantage is the provision of a snag resistant loop which prevents injury to delicate eye tissue during implantation, centration, or removal of the lens.

The lens of the Shearing type requires more maneuvers, skill and a longer learning process for surgeons to master when inserting the superior loop of the lens, thus resulting in increasing the chance for injuring delicate eye tissue. These objections are eliminated when the snag resistant lens of this invention is used. It would be relatively easy for a surgeon to master the implantation, centration or removal of this lens without injury to delicate eye tissue.

Another advantage is that only a small force is needed by the surgeon to position the superior snag resistant ring during implantation. The tangentially curved resilient strands and the snag free loose end of the strand transfers this force into a circular movement of the lens body resulting in self centering of the lens with avoidance of undue pressure on the zonules below.

Since the lens of the invention is one that is a universal lens, a surgeon who is a novitiate will find this lens especially helpful because this lens is not only self-centering but also needs only minimal manipulation during implantation in an eye chamber.

Implantation of this new lens avoids the spring back which is present in the Shearing type lens which results in decentration. This lens, because of its tangentially formed strands, changes the downward force into a circular motion, thus avoiding any spring back landing to cause decentration.

All conventional posterior lenses are more easily implanted through a dilated pupil. The new snag free lens can be implanted through a dilated or a miotic pupil with equal ease.

If during a cataract operation, the delicate tissue of an eye is ruptured, use of the Shearing type lens with its free pointed end presents added danger of extending the tear because the free pointed end can slide further into the vitreous cavity. The snag resistant ring of this new lens avoids this difficulty.

In addition, while operating to be safe, the surgeon may decide to use this lens in the anterior chamber to avoid aborting the implantation procedure. This cannot be done with any of the prior art lenses. However, it can be done if the surgeon is using the lens of this invention.

The lens of this invention is the first universal lens implant since it can be implanted in any size of eye chamber, in a posterior chamber or in an anterior chamber. A tremendous saving in the stocking of an unduly large supply of lenses for surgeons and hospitals. Only the snag resistant lens of this invention need be stocked. No necessity now to stock many different sizes, a posterior lens and an anterior lens. All the different lenses have now been replaced with only one lens, a universally useful lens.

Finally, this novel lens can be used to determine the size of an eye chamber. This has never been possible before this lens. By merely measuring the distance between the edge of the loop and the edge of the lens with a microscopic chronometer and adding thereto the diameter of the ring and lens, the size of an eye chamber can be determined. No lens in the prior art is capable of effecting this result.

Those skilled in the art will also readily appreciate that there are various other modifications and adaptations of the precise form of the lens herein shown. For example, the ring which is approximately circular, could also be elliptical and would thus be equally useful with all the accompanying advantages so long as it is snag resistant.

What is claimed is:

1. An intraocular lens comprising:

a lens body;

at least two spaced flexible positioning and supporting elements integrally formed with said lens body as a one-piece construction and extending radially, outwardly from the periphery of said lens body;

said elements [defining a continuous, substantially circular arc having a diameter greater than the diameter of said lens body, said arc curved toward said lens circumference and] terminating in a free end spaced from said periphery; and

snag-resistant means integrally formed on the free end of *each of* said elements for smoothly guiding and positioning the lens across contacted eye tissue when implanting the lens, said snag resistant means having an uninterrupted, continuously, smoothly curved outer periphery which merges with said free end and is [substantially] *at least three times* greater in [size] *width* than the width of said flexible elements, *said snag resistant elements and said positioning and supporting elements being substantially coplanar.*

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2. An intraocular lens as recited in claim 1 wherein there are two of said flexible positioning and supporting elements and said elements are positioned opposite one another.

3. An intraocular lens as recited in claim 1 wherein said snag-resistant means comprise a circular disc.

4. An intraocular lens as recited in claim 3 wherein said disc has an opening therethrough.

5. An intraocular lens as recited in claim 3 wherein said disc has a diameter which is at least three times greater than the width of said flexible elements and at least one-fifth as great as the width of said lens body.

6. An intraocular lens as recited in claim 1 wherein said flexible elements contain a support member integrally formed with said flexible elements and the periphery of said lens body, said support member joined to said flexible element at a position remote from the point where said flexible element contacts the periphery of said lens body, thus defining a substantially triangular support base for said flexible element.

7. An intraocular lens as recited in claim 3 wherein said circular disc and said lens body lie in substantially the same vertical plane.

8. An intraocular lens as set forth in claim 1 wherein said flexible elements and said snag-resistant means are made from a clear material.

9. An intraocular lens as set forth in claim 1 wherein said flexible elements and said snag-resistant means are made from a colored material.

10. A method of measuring the size of an eye chamber by implanting a lens having tangentially resilient strands on opposed sides of an intraocular lens attached to the body of said lens; wherein the free end is connected to a snag resistant ring, adding the diameter sizes of said ring and said lens to the distance between the edge of said ring and the edge of said lens in mm. to determine the size of said eye chamber in mm.

11. An intraocular lens as recited in claim 1 wherein said elements define a continuously curved arc, said arc curved toward said lens circumference.

* * * * *

United States Patent [19]

Pannu

[11] **4,435,855**

[45] **Mar. 13, 1984**

[54] **UNIVERSAL INTRAOCULAR LENS AND A METHOD OF MEASURING AN EYE CHAMBER SIZE**

[76] Inventor: **Jaswant S. Pannu,** 6120 Almond Ter., Plantation, Fla. 33317

[21] Appl. No.: **261,953**

[22] Filed: **May 8, 1981**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 136,243, Apr. 1, 1980, abandoned.

[51] **Int. Cl.³** **A61F 1/16;** A61F 1/24; A61B 5/00

[52] **U.S. Cl.** .... **3/13;** 33/174 D; 128/774

[58] **Field of Search** .... 3/13, 1; 128/774; 33/174 D

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4,249,271	2/1981	Poler	3/13
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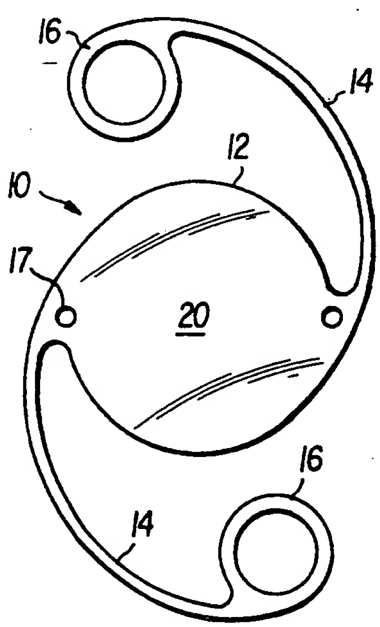
Primary Examiner—Ronald L. Frinks

Attorney, Agent, or Firm—Schuyler, Banner, Birch, McKie & Beckett

[57] **ABSTRACT**

A universal intraocular lens that may be implanted in an eye, in an anterior chamber, in a posterior chamber and in any size eye chamber wherein a tangential flexible strand is attached to a lens at one end and the other free end is formed into a snag resistant ring, or disc which is approximately circular to avoid injury to delicate eye tissue during implantation, centration or removal of said lens.

10 Claims, 9 Drawing Figures



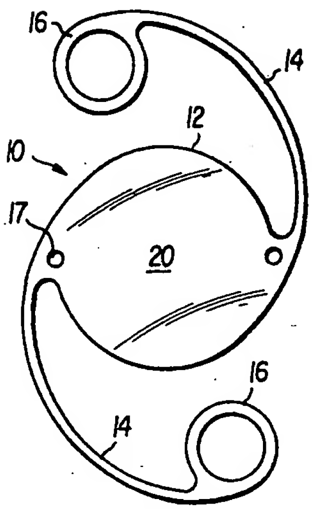


FIG. 1

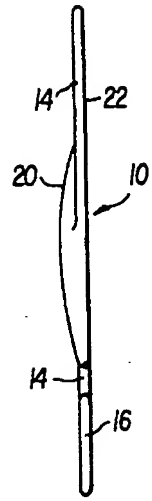


FIG. 2

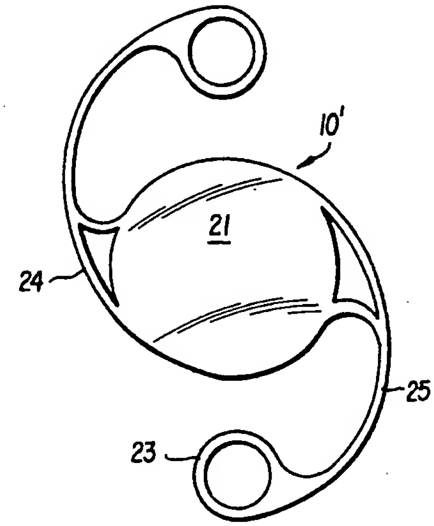


FIG. 3

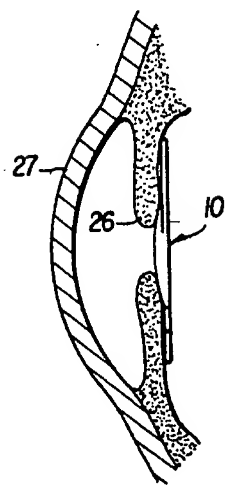


FIG. 4

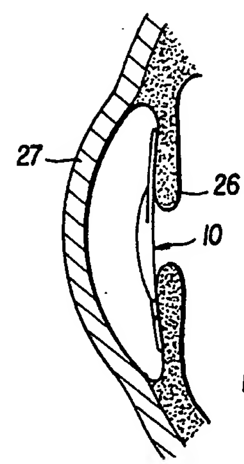


FIG. 5

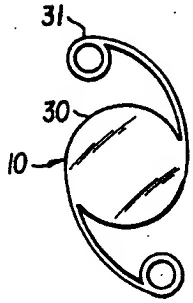


FIG. 6A

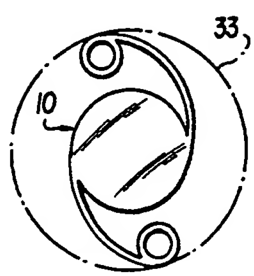


FIG. 6B

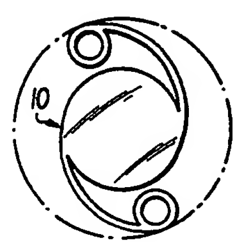


FIG. 6C

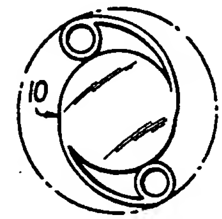


FIG. 6D

UNIVERSAL INTRAOCULAR LENS AND A METHOD OF MEASURING AN EYE CHAMBER SIZE

This application is a continuation-in-part of Application Ser. No. 136,243 which was filed on Apr. 1, 1980 and now abandoned by applicant. The content of said application is incorporated in this application.

An intraocular lens is normally implanted in the anterior or posterior chamber of an eye following extraction of a cataractous lens. Since replaceable lenses are different for use in a posterior chamber than use in an anterior chamber, two different lenses must be kept in stock. In addition, the eye chamber could vary in size, again requiring additional varied sizes in stock.

The most widely used Shearing type lenses are utilized only for posterior chamber implantation. It is a plastic lens having two opposed flexible strands, one a superior loop and the other an inferior loop, wherein the free ends are arched and end in a point. This makes it extremely difficult for a surgeon to master the implantation of the superior loop during realignment or removal of the lens without injuring the delicate tissue of an eye.

One of the main objects of this invention is to avoid this snagging point of the loop by replacing it with a snag resistant disc, ring or closed circular loop.

Another object is to provide such a snag resistant strand so that both right and left handed surgeons may be able to use the same lens, thus eliminating the need for a specially designed lens for a left handed surgeon.

Another object is to provide a universal lens that can be used in an anterior or posterior chamber of an eye and can be equally used in a small, medium or large eye chamber size, thus avoiding the stocking of a large number of different types and sizes by hospitals and surgeons.

Another object is to provide just one type of universal lens for all eye transplants so that all surgeons will become familiar with it and greater safety can be provided for the patients.

Another object is to so tangentially shape the flexible strand as to cause the lens to self-center when implanted.

A further object is to use the distance between the ring edge and the lens edge to determine the size of an eye chamber.

Details of this invention will become more readily apparent from the following description when taken in conjunction with the accompanying drawings:

IN THE DRAWINGS

FIG. 1 is an illustration of the intraocular lens of this invention in a front elevational view;

FIG. 2 is a side elevational view of the lens of FIG. 1;

FIG. 3 is another form of the lens in a front elevational view;

FIG. 4 is a cross-sectional schematic view of a human eye with the lens of this invention implanted in the posterior chamber;

FIG. 5 is a similar cross-sectional schematic view of a human eye with the same lens implanted in an anterior chamber; and

FIG. 6A to D is a schematic cross-sectional view to illustrate how the eye chamber is measured for size.

In FIG. 1, there is shown intraocular lens 10 of this invention, having a lens body 12 measuring 6 mm in diameter and centration openings 17 that measure 0.25 mm in diameter which may be used for alignment of the lens during implantation of the lens. The lens is formed of clinical quality of polymethymethacrylate and has an overall length of 13.5 mm inclusive of the flexible strands 14 which are tangentially curved towards the lens circumference to the left on the superior strand while the inferior strand is tangentially curved to the right. This enables a surgeon to implant the lens with minimal force and permits the lens to be self-centering. The snag resistant looped disc 16 and strand 14 are integrally molded to the body of the lens. The thickness of the strand is 0.25 mm and the lens thickness is 0.85 mm as shown in FIG. 2.

In FIG. 3, there is shown another form of the intraocular lens 10' of this invention. The body 21 of the lens and the resilient strands 25 supporting the snag resistant rings 23 are integrally molded to the lens body, however to provide a sturdier base 24, the shape is molded into a triangular design which supports the flexible strand and said strand is shaped to be tangential to the lens circumference. In use, this lens is an actual commercial model and upon implantation, it automatically becomes self centered. It is essential that this ring be at least three times greater than the width of the flexible strand and at least one fifth as great as the width of the lens to result in smoothly guiding the snag resistant ring across the iris or other eye tissue when implanting the lens in either an anterior or posterior chamber which is small, medium or large. When this lens is implanted into a posterior chamber as shown in FIG. 4, the snag resistant free end rings will snugly fit into the pocket found near the stationary zone of the iris 26. The lens when so implanted is self-centering and the rings lie in a plane sufficiently close to the plane of the lens so that the rings and the lens can snugly fit into the eye chamber without causing any spring back or buldging forward which would injure delicate eye tissue.

Although centration holes are normally provided on such lenses, the lens of this invention can dispense with such holes because with the ring structure and the tangentially shaped resilient strands, the right is self centerable.

In FIG. 5, there is shown the implantation of this novel lens into an anterior chamber of an eye. The snag resistant free end of the tangential strand fits snugly in the corners between the mobile zone of the iris 26 and the cornea 27. In this instance, the lens is again self centering because of the same factors present in the posterior implantation.

Because of the ring shaped free end it is possible to use this lens for the first time to measure the size of the eye chamber.

In FIG. 6, there is shown a schematic illustration of how to measure the size of an eye chamber. In (a) there is shown the lens of this invention having a lens body whose diameter is 6 mm and whose ring diameter is 2.5 mm. In (b) such a lens is implanted in an eye chamber 33. The distance between the loop and the lens edge is measured to be 1 mm. When added together, it measures a 13 mm eye chamber size which is a large chamber size. In (c), wherein the ring to lens distance is less, a 12 mm eye chamber is measured which is a medium chamber size. In (d), wherein the ring and lens edges meet, the eye chamber measures 11 mm which is a small chamber size. To aid in sighting for measuring, it is helpful to slightly tint the snag resistant rings, however they could also be clear.

To sum up, there are many advantages in using the lens of this invention over any of the prior art lenses.

The most important advantage is the provision of a snag resistant loop which prevents injury to delicate eye tissue during implantation, centration, or removal of the lens.

The lens of the Shearing type requires more maneuvers, skill and a longer learning process for surgeons to master when inserting the superior loop of the lens, thus resulting in increasing the chance for injuring delicate eye tissue. These objections are eliminated when the snag resistant lens of this invention is used. It would be relatively easy for a surgeon to master the implantation, centration or removal of this lens without injury to delicate eye tissue.

Another advantage is that only a small force is needed by the surgeon to position the superior snag resistant ring during implantation. The tangentially curved resilient strands and the snag free loose end of the strand transfers this force into a circular movement of the lens body resulting in self centering of the lens with avoidance of undue pressure on the zonules below.

Since the lens of the invention is one that is a universal lens, a surgeon who is a novitiate will find this lens especially helpful because this lens is not only self-centering but also needs only minimal manipulation during implantation in an eye chamber.

Implantation of this new lens avoids the spring back which is present in the Shearing type lens which results in decentration. This lens, because of its tangentially formed strands, changes the downward force into a circular motion, thus avoiding any spring back landing to cause decentration.

All conventional posterior lenses are more easily implanted through a dilated pupil. The new snag free lens can be implanted through a dilated or a miotic pupil with equal ease.

If during a cataract operation, the delicate tissue of an eye is ruptured, use of the Shearing type lens with its free pointed end presents added danger of extending the tear because the free pointed end can slide further into the vitreous cavity. The snag resistant ring of this new lens avoids this difficulty.

In addition, while operating to be safe, the surgeon may decide to use this lens in the anterior chamber to avoid aborting the implantation procedure. This cannot be done with any of the prior art lenses. However, it can be done if the surgeon is using the lens of this invention.

The lens of this invention is the first universal lens implant since it can be implanted in any size of eye chamber, in a posterior chamber or in an anterior chamber. A tremendous saving in the stocking of an unduly large supply of lenses for surgeons and hospitals. Only the snag resistant lens of this invention need be stocked. No necessity now to stock many different sizes, a posterior lens and an anterior lens. All the different lenses have now been replaced with only one lens, a universally useful lens.

Finally, this novel lens can be used to determine the size of an eye chamber. This has never been possible before this lens. By merely measuring the distance between the edge of the loop and the edge of the lens with a microscopic chronometer and adding thereto the diameter of the ring and lens, the size of an eye chamber can be determined. No lens in the prior art is capable of effecting this result.

Those skilled in the art will also readily appreciate that there are various other modifications and adaptations of the precise form of the lens herein shown. For example, the ring which is approximately circular, could also be elliptical and would thus be equally useful with all the accompanying advantages so long as it is snag resistant.

What is claimed is:

1. An intraocular lens comprising:
- a lens body;
- at least two spaced flexible positioning and supporting elements integrally formed with said lens body as a one-piece construction and extending radially, outwardly from the periphery of said lens body;
- said elements defining a continuous, substantially circular arc having a diameter greater than the diameter of said lens body, said arc curved toward said lens circumference and terminating in a free end spaced from said periphery; and
- snag-resistant means integrally formed on the free end of said elements for smoothly guiding and positioning the lens across contacted eye tissue when implanting the lens, said snag resistant means having an uninterrupted, continuously, smoothly curved outer periphery which merges with said free end and is substantially greater in size than the width of said flexible elements.

2. An intraocular lens as recited in claim 1 wherein there are two of said flexible positioning and supporting elements and said elements are positioned opposite one another.

3. An intraocular lens as recited in claim 1 wherein said snag-resistant means comprise a circular disc.

4. An intraocular lens as recited in claim 3 wherein said disc has an opening therethrough.

5. An intraocular lens as recited in claim 3 wherein said disc has a diameter which is at least three times greater than the width of said flexible elements and at least one-fifth as great as the width of said lens body.

6. An intraocular lens as recited in claim 1 wherein said flexible elements contain a support member integrally formed with said flexible elements and the periphery of said lens body, said support member joined to said flexible element at a position remote from the point where said flexible element contacts the periphery of said lens body, thus defining a substantially triangular support base for said flexible element.

7. An intraocular lens as recited in claim 3 wherein said circular disc and said lens body lie in substantially the same vertical plane.

8. An intraocular lens as set forth in claim 1 wherein said flexible elements and said snag-resistant means are made from a clear material.

9. An intraocular lens as set forth in claim 1 wherein said flexible elements and said snag-resistant means are made from a colored material.

10. A method of measuring the size of an eye chamber by implanting a lens having tangentially resilient strands on opposed sides of an intraocular lens attached to the body of said lens; wherein the free end is connected to a snag resistant ring, adding the diameter sizes of said ring and said lens to the distance between the edge of said ring and the edge of said lens in mm. to determine the size of said eye chamber in mm.

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